Citation:

Phillips SM, Bandini LG, Cyr H, Colclough-Douglas S, Naumova E, Must A. Dairy food consumption and body weight and fatness studied longitudinally over the adolescent period. *Int J Obes Relat Metab Disord*. 2003 Sep;27(9):1106-13.

PubMed ID: 12917718

Study Design:

Cohort study (longitudinal, prospective)

Class:

B - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To assess the metabolic, dietary, and behavioral factors that predict changes in body composition with growth and development in girls during the adolescent period, the current analysis was undertaken to examine the relation of dairy food intake with relative weight status and percentage body fat.

Inclusion Criteria:

8 to 12 year old, premenarcheal, and nonobese based on tripceps skinfold thickness <=85th percentile for age and sex according to NHANES I.

Exclusion Criteria:

Participants who left more than 12 items blank on the FFQ, when daily energy intake was less than 500 kcal or greater than 5000 kcal as calculated from the FFQ, or had fewer than 3 annual visits.

Description of Study Protocol:

Recruitment

Massachusetts Institute of Technology Growth and Development Study: all 4th and 5th grade girls in Cambridge, MA, public schools were invited to participate with additional subjects recruited from the MIT summer day camp and through contact with friends and siblings of subjects between 1990 and 1993.

Design

Self-administered Willett semiquantitative food frequency questionnaire (116 items, asked about

the past year) at each annual follow-up visit. Height, weight, and percent body fat were assessed as well as physical activity and inactivity.

Statistical Analysis

- paired t-tests (compare changes between baseline and exit)
- generalized additive modeling (visualize relationship between BMI z-score or percent body fat and exposures)
- linear mixed effects modeling (evaluate longitudinal relation between relative body weight or body fatness and dairy food consumption)

Data Collection Summary:

Timing of Measurements

Girls were followed annually until 4 years after menarche (duration of the study not indicated).

Dependent Variables

- BMI z-score
- %BF (percent body fat)

Independent Variables

Dairy food intake (daily servings of dairy foods, percentage of daily kilocalories from dairy foods, dairy calcium (mg) from dairy food, percentage of calories from low-fat dairy foods and percentage of calories from high-fat dairy food)

Control Variables

Age, physical activity index, inactivity index, parental overweight, race/ethnicity, daily servings of fruits and vegetables, percentage of daily calories from sugar-sweetened soda, percentage of daily calories from snack foods, percentage of daily calories from protein, percentage of daily calories from carbohydrates, and percentage of daily calories from fat.

Description of Actual Data Sample:

Initial N: 196 girls

Attrition (final N): 172 girls

Age: 8-12 year old

Ethnicity: White (74%), African American (26%)

Location: Cambridge and Somerville, MA

Summary of Results:

Number of dairy food servings was 3.1±1.6 and the percentage of daily kcal from dairy foods was 19.9%±9.2%. Daily servings of dairy foods and calcium from dairy foods decreased significantly between baseline and study exit.

After adjusting for covariates, no statistically significant relationship was found between dairy food consumption (servings per day, percent of daily calories, or calcium from dairy foods) and BMI z-score. No significant relation between percentage of calories from low- or full-fat dairy and BMI z-score was observed.

There was no significant relation between daily servings of dairy food or percentage of daily calories from dairy foods and percent body fat. No significant relation between percentage of calories from low- or full-fat dairy and percent body fat was observed.

Author Conclusion:

Avoidance of diary foods due to a possible association with relative body weight is not supported by these findings. We find no evidence that dairy food consumption is associated with BMI z-score or percent body fat during adolescence.

Reviewer Comments:

***Strengths**:*

- *Analytic approach (characterizes individual variation relative to the population mean while taking into account the correlation between repeated measurements on the same subject and different numbers of measurements per subject; additional analyses conducted in this cohort indicate that both the FFQ and BIA provide good estimates of dairy intake and percent body fat, respectively).*
- *Type II error unlikely, given statistical power of analysis.*

***Limitations**:*

- *Dietary methodologies are subject to measurement error (FFQ).*
- *Differential reporting of specific foods (428 g of dairy products consumed per day by girls in this study compared to 269 g of diary products consumed per day of adolescent females aged 12-19 years based on diet recall of the CSFII survey).*
- *Self-reported dietary recall.*
- *Exclusion of girls at baseline who are already overweight allows only examination of role of dairy foods on weight or fatness changes in normal weight preadolescent girls.*
- *Not all racial/ethnic groups represented.*

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes

3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	Yes
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	Yes
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A

3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	Yes
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	???
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	???
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	???
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	N/A
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	Yes
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A

6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	N/A
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
8.6.	Was clinical significance as well as statistical significance reported?	Yes
8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**	Yes

10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes